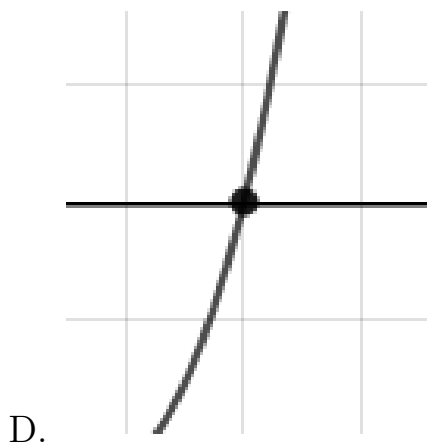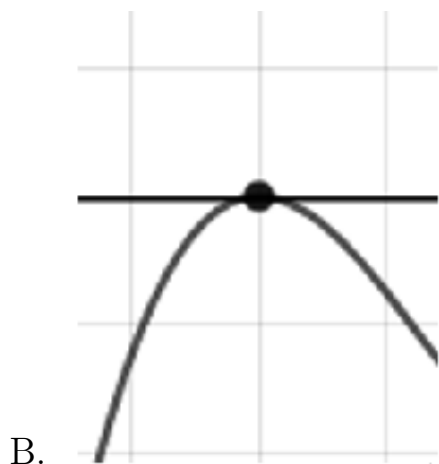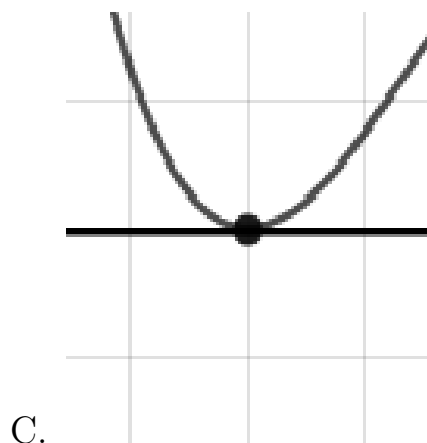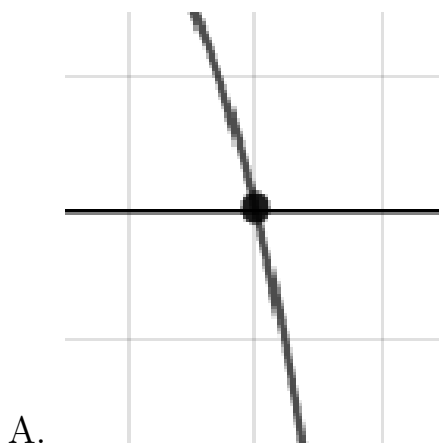1. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{2}{3}, -7, \text{ and } \frac{7}{5}$$

  A. $a \in [14, 16], b \in [74, 75], c \in [-204, -195], \text{ and } d \in [97, 102]$

  B. $a \in [14, 16], b \in [74, 75], c \in [-204, -195], \text{ and } d \in [-98, -96]$

  C. $a \in [14, 16], b \in [83, 101], c \in [-98, -83], \text{ and } d \in [-98, -96]$

  D. $a \in [14, 16], b \in [-81, -66], c \in [-204, -195], \text{ and } d \in [-98, -96]$

  E. $a \in [14, 16], b \in [-116, -113], c \in [62, 71], \text{ and } d \in [97, 102]$

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2. Describe the zero behavior of the zero $x = 8$ of the polynomial below.

$$f(x) = -4(x + 8)^7(x - 8)^{10}(x - 4)^4(x + 4)^8$$
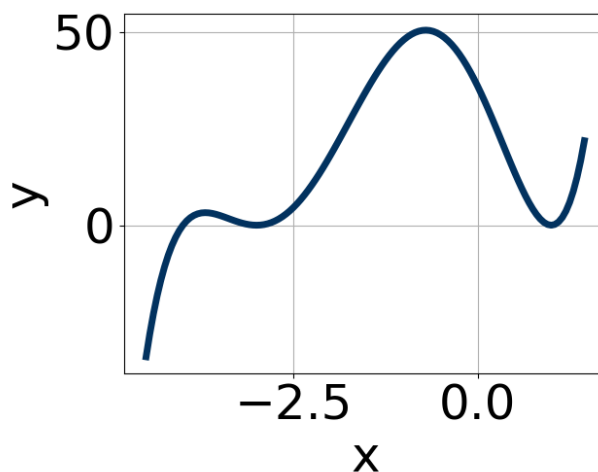

A.

C.

B.

D.

E. None of the above.

---

3. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$-2 + 4i \text{ and } 4$$

A. $b \in [0.9, 2.6], c \in [-10, -4.4],$ and $d \in [15, 18]$

B. $b \in [-3.1, 0.1], c \in [2.6, 4.7],$ and $d \in [79, 82]$

C. $b \in [0.9, 2.6], c \in [-6.7, 0.2],$ and $d \in [-12, -6]$

D. $b \in [-3.1, 0.1], c \in [2.6, 4.7],$ and $d \in [-82, -75]$
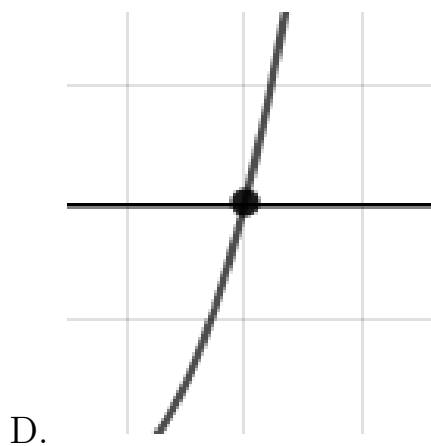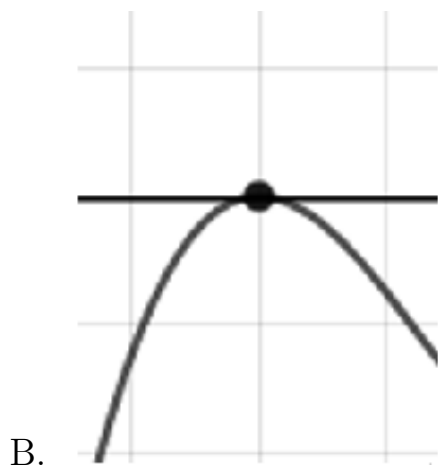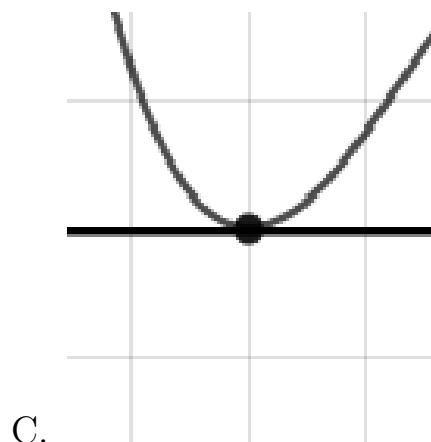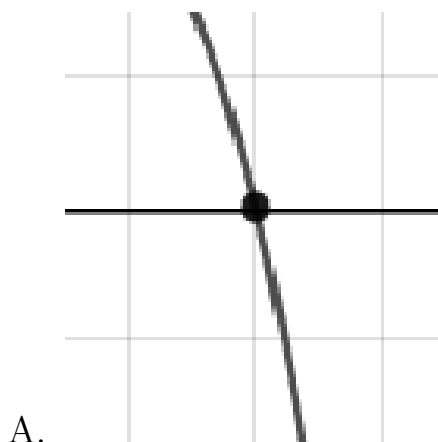
E. None of the above.

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4. Which of the following equations *could* be of the graph presented below?

A. $3(x - 1)^8(x + 3)^7(x + 4)^9$

B. $15(x - 1)^4(x + 3)^8(x + 4)^5$

C. $13(x - 1)^{10}(x + 3)^7(x + 4)^6$

D. $-5(x - 1)^6(x + 3)^4(x + 4)^4$

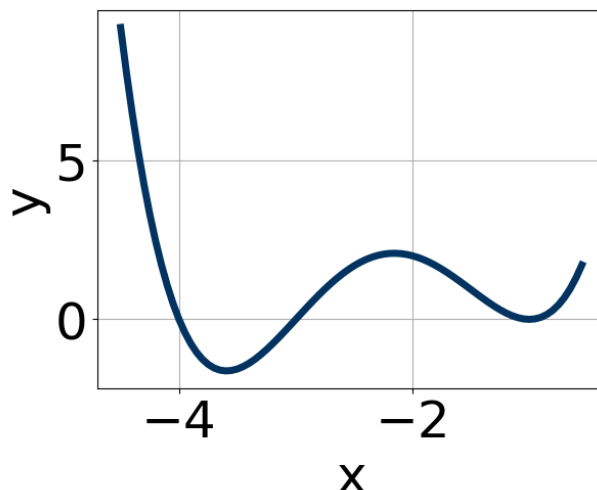E. $-11(x - 1)^{10}(x + 3)^{10}(x + 4)^7$

5. Describe the zero behavior of the zero $x = -5$ of the polynomial below.

$$f(x) = 6(x+8)^4(x-8)^2(x-5)^5(x+5)^2$$

A.

C.

B.

D.

E. None of the above.

6. Which of the following equations *could* be of the graph presented below?

A. $-7(x+1)^6(x+3)^9(x+4)^7$

B. $3(x+1)^5(x+3)^4(x+4)^5$

C. $7(x+1)^8(x+3)^9(x+4)^{11}$

D. $-7(x+1)^4(x+3)^9(x+4)^{10}$
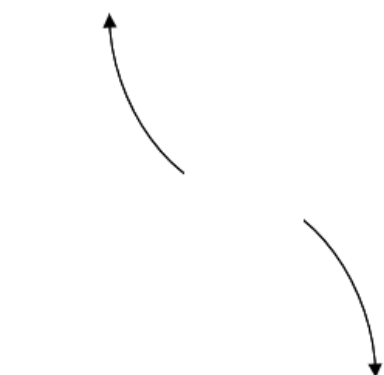
E. $17(x+1)^6(x+3)^8(x+4)^5$

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7. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.
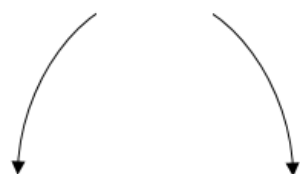
$$5 + 4i \text{ and } 2$$

A. $b \in [-20, -7], c \in [60, 64.2],$ and $d \in [-82.1, -78.6]$

B. $b \in [-4, 6], c \in [-9.6, -6.6],$ and $d \in [8.9, 14]$

C. $b \in [12, 16], c \in [60, 64.2],$ and $d \in [79, 82.4]$

D. $b \in [-4, 6], c \in [-6.7, -2.2],$ and $d \in [4.9, 9.8]$

E. None of the above.

---

8. Describe the end behavior of the polynomial below.
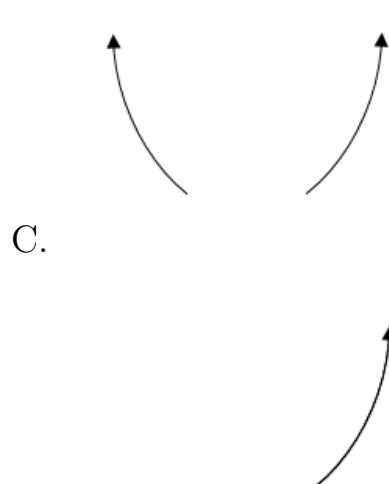
$$f(x) = 7(x+8)^4(x-8)^7(x+3)^3(x-3)^3$$
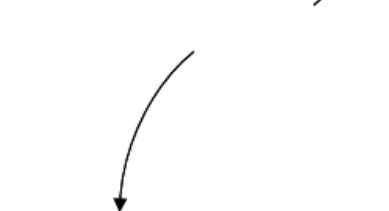
C.

A.

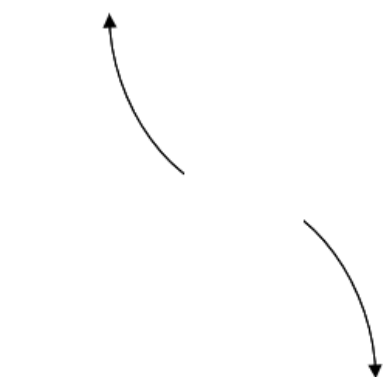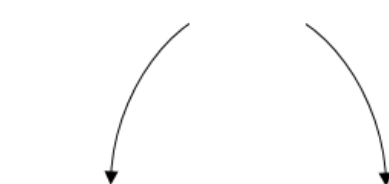B.   D.

E. None of the above.

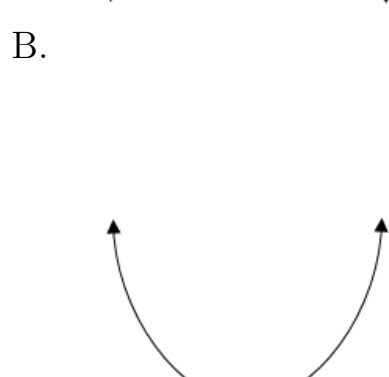9. Describe the end behavior of the polynomial below.

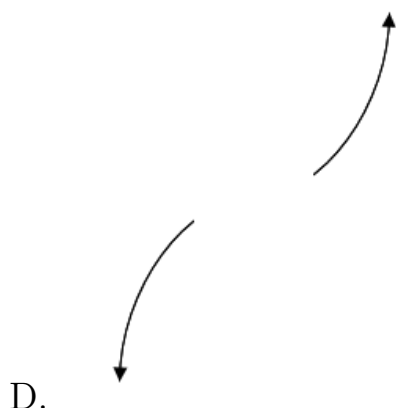$$f(x) = 5(x+5)^3(x-5)^8(x-7)^3(x+7)^3$$

B.

A.

C.

D.

E. None of the above.

---

10. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{-3}{2}, \frac{-4}{3}, \text{ and } \frac{-1}{4}$$

A. $a \in [21, 26], b \in [2, 9], c \in [-61, -45],$ and $d \in [-12, -9]$

B. $a \in [21, 26], b \in [69, 75], c \in [60, 68],$ and $d \in [9, 16]$

C. $a \in [21, 26], b \in [-68, -61], c \in [27, 37],$ and $d \in [9, 16]$

D. $a \in [21, 26], b \in [69, 75], c \in [60, 68],$ and $d \in [-12, -9]$

E. $a \in [21, 26], b \in [-77, -65], c \in [60, 68],$ and $d \in [-12, -9]$

---

11. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{-5}{3}, \frac{3}{5}, \text{ and } \frac{-4}{3}$$

A. $a \in [42, 46], b \in [107, 114], c \in [12, 24],$ and $d \in [-67, -56]$

B. $a \in [42, 46], b \in [-42, -40], c \in [-92, -85],$ and $d \in [59, 61]$

C. $a \in [42, 46], b \in [9, 14], c \in [-111, -107],$ and $d \in [-67, -56]$

D. $a \in [42, 46], b \in [-114, -106], c \in [12, 24],$ and $d \in [59, 61]$

E. $a \in [42, 46], b \in [107, 114], c \in [12, 24],$ and $d \in [59, 61]$

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12. Describe the zero behavior of the zero $x = 6$ of the polynomial below.

$$f(x) = -3(x + 5)^{10}(x - 5)^7(x - 6)^{12}(x + 6)^9$$

A.

C.

B.

D.

E. None of the above.

---

13. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.
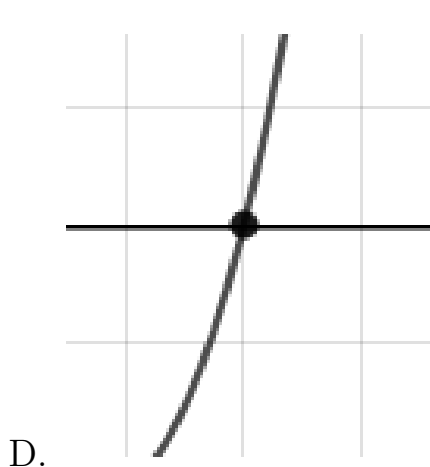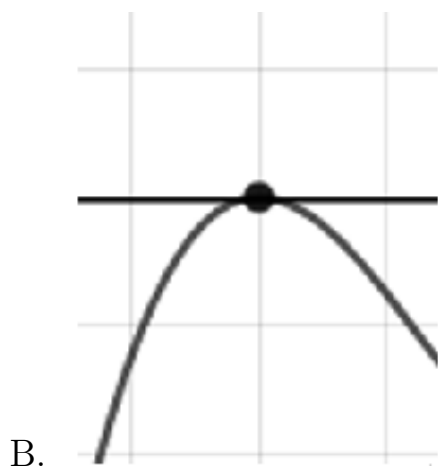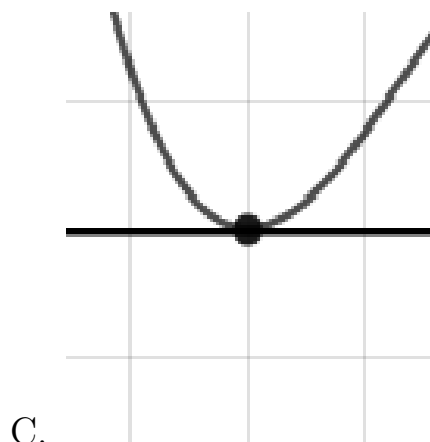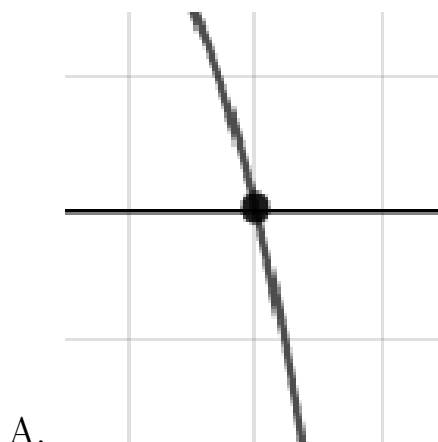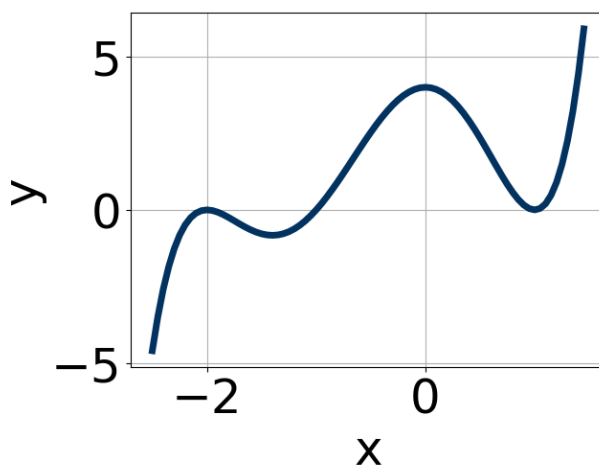
$$4 - 5i \text{ and } -2$$

A. $b \in [1, 2], c \in [6, 8]$, and $d \in [9, 16]$

B. $b \in [6, 8], c \in [22, 31]$, and $d \in [-87, -77]$

C. $b \in [1, 2], c \in [-8, 5]$, and $d \in [-12, -6]$

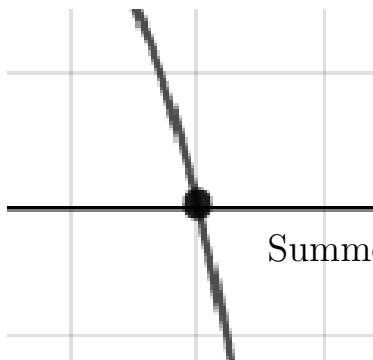D. $b \in [-6, -2], c \in [22, 31]$, and $d \in [75, 87]$

E. None of the above.

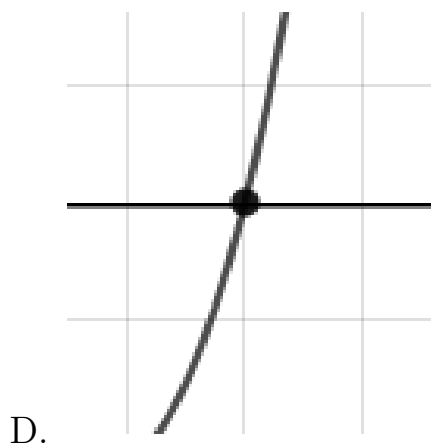14. Which of the following equations *could* be of the graph presented below?

A. $-8(x + 2)^{10}(x - 1)^6(x + 1)^8$

B. $10(x + 2)^6(x - 1)^6(x + 1)^5$

C. $-15(x + 2)^6(x - 1)^4(x + 1)^9$

D. $5(x + 2)^{10}(x - 1)^{11}(x + 1)^7$

E. $15(x + 2)^{10}(x - 1)^9(x + 1)^6$

---

15. Describe the zero behavior of the zero $x = -6$ of the polynomial below.

$$f(x) = -9(x - 6)^9(x + 6)^{14}(x + 3)^4(x - 3)^6$$

B.

C.

D.
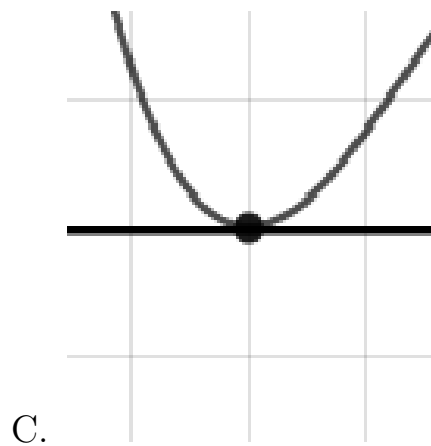
E. None of the above.

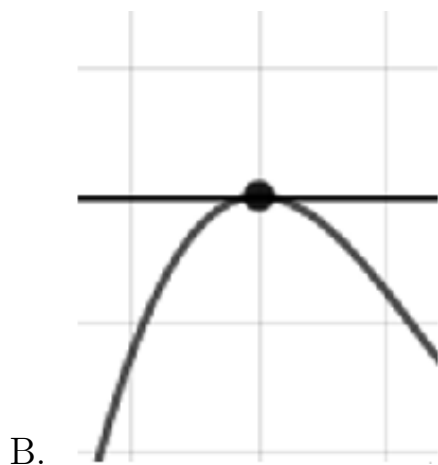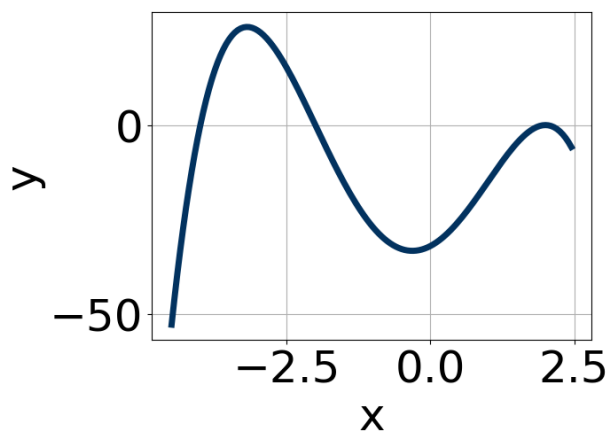16. Which of the following equations *could* be of the graph presented below?

A. $13(x-2)^8(x+2)^{11}(x+4)^{10}$

B. $4(x-2)^6(x+2)^5(x+4)^9$

    C. $-12(x-2)^{10}(x+2)^8(x+4)^7$

    D. $-14(x-2)^7(x+2)^4(x+4)^9$

    E. $-11(x-2)^6(x+2)^{11}(x+4)^7$

17. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$-5 + 4i \text{ and } -3$$

    A. $b \in [-7, 6], c \in [1, 11],$ and $d \in [8, 23]$

    B. $b \in [-7, 6], c \in [-6, 2],$ and $d \in [-15, -11]$

    C. $b \in [-22, -12], c \in [69, 77],$ and $d \in [-125, -114]$

    D. $b \in [10, 21], c \in [69, 77],$ and $d \in [115, 125]$

    E. None of the above.

18. Describe the end behavior of the polynomial below.

$$f(x) = 2(x+9)^3(x-9)^8(x+5)^3(x-5)^4$$

A.

B.

C.

D.

E. None of the above.

19. Describe the end behavior of the polynomial below.

$$f(x) = -7(x-4)^5(x+4)^6(x-5)^4(x+5)^6$$

C.

A.

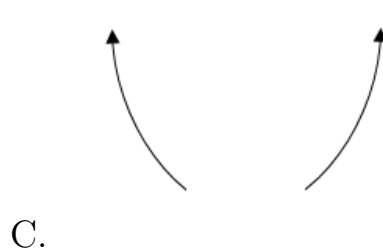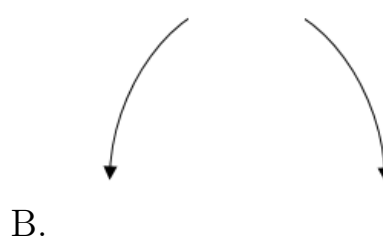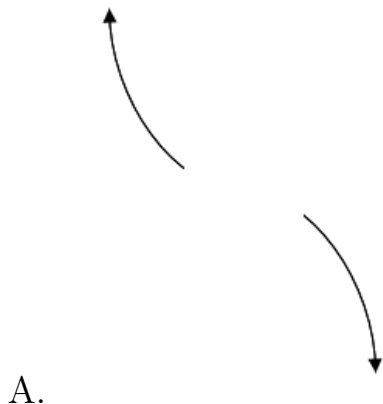B.   D.

E. None of the above.

20. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.
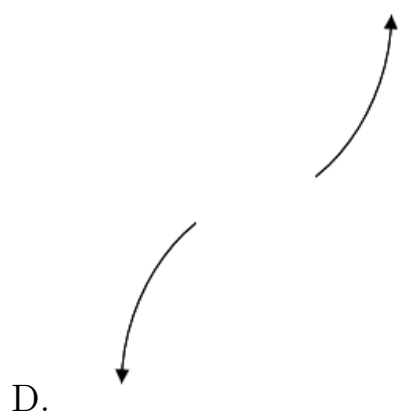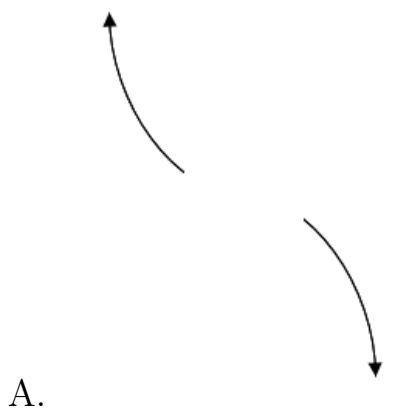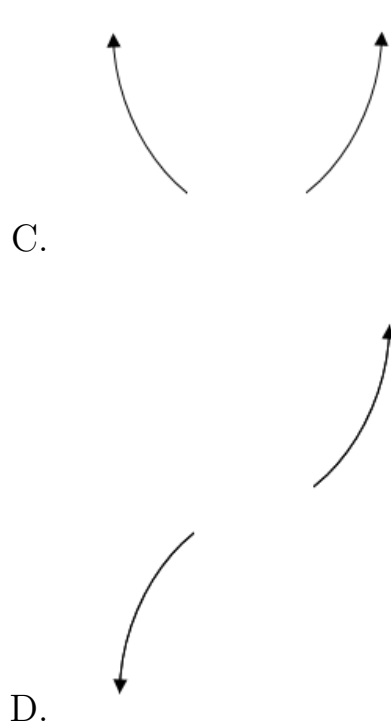
$$\frac{-1}{3}, 1, \text{ and } \frac{-2}{5}$$

   A. $a \in [10, 17], b \in [3, 11], c \in [-9.39, -8.23],$ and $d \in [-0.3, 4.6]$

   B. $a \in [10, 17], b \in [10, 23], c \in [-1.88, -0.96],$ and $d \in [-2.8, -0.2]$

   C. $a \in [10, 17], b \in [-7, -3], c \in [-9.39, -8.23],$ and $d \in [-2.8, -0.2]$

   D. $a \in [10, 17], b \in [-7, -3], c \in [-9.39, -8.23],$ and $d \in [-0.3, 4.6]$

   E. $a \in [10, 17], b \in [-18, -11], c \in [-4.09, -2.6],$ and $d \in [-0.3, 4.6]$
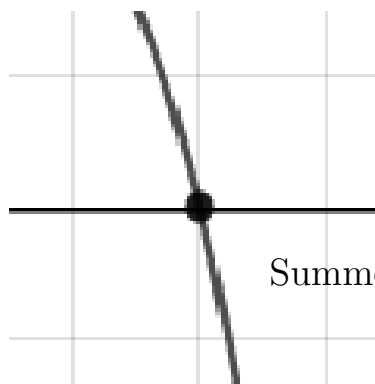
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21. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{7}{3}, 1, \text{ and } \frac{-7}{2}$$

   A. $a \in [0, 14], b \in [28, 31.1], c \in [12, 15],$ and $d \in [-57, -44]$

   B. $a \in [0, 14], b \in [0.9, 2], c \in [-60, -55],$ and $d \in [-57, -44]$

   C. $a \in [0, 14], b \in [0.9, 2], c \in [-60, -55],$ and $d \in [48, 54]$

   D. $a \in [0, 14], b \in [40.6, 41.8], c \in [82, 89],$ and $d \in [48, 54]$

   E. $a \in [0, 14], b \in [-4.2, 0.2], c \in [-60, -55],$ and $d \in [-57, -44]$

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22. Describe the zero behavior of the zero $x = -4$ of the polynomial below.

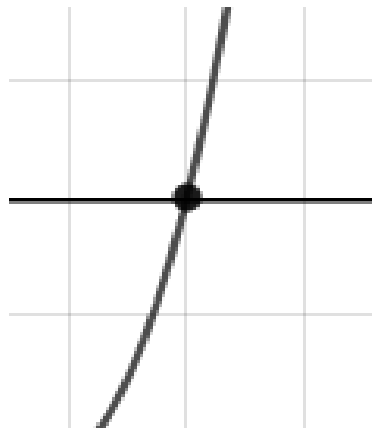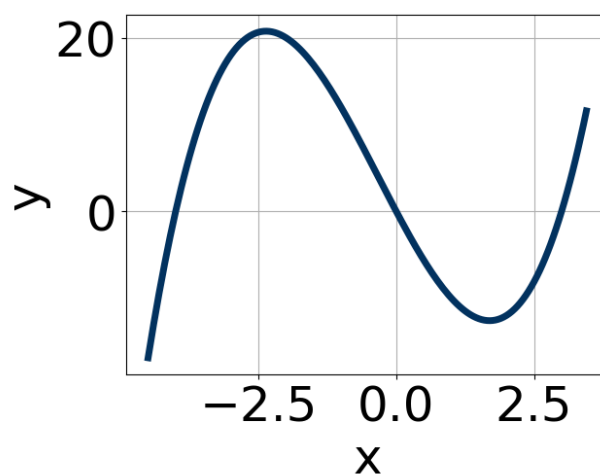$$f(x) = -4(x + 4)^5(x - 4)^8(x - 9)^3(x + 9)^4$$

B.

C.

D.

E. None of the above.

23. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$5 - 2i \text{ and } 1$$

A. $b \in [-14, -9], c \in [37, 44], \text{ and } d \in [-34, -23]$

B. $b \in [2, 13], c \in [37, 44], \text{ and } d \in [27, 33]$

C. $b \in [-2, 6], c \in [-2, 5], \text{ and } d \in [-6, 1]$

D. $b \in [-2, 6], c \in [-6, -5], \text{ and } d \in [0, 8]$
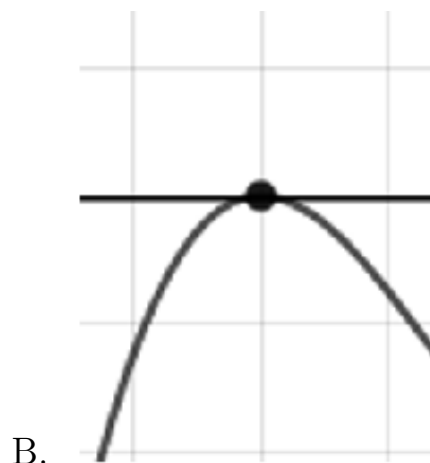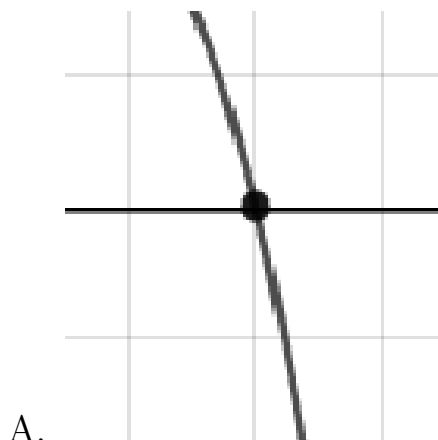
E. None of the above.

24. Which of the following equations *could* be of the graph presented below?

A. $-11x^6(x+4)^{11}(x-3)^5$

B. $7x^9(x+4)^{11}(x-3)^9$

C. $-6x^7(x+4)^5(x-3)^5$

D. $6x^8(x+4)^4(x-3)^{11}$

E. $8x^8(x+4)^5(x-3)^7$

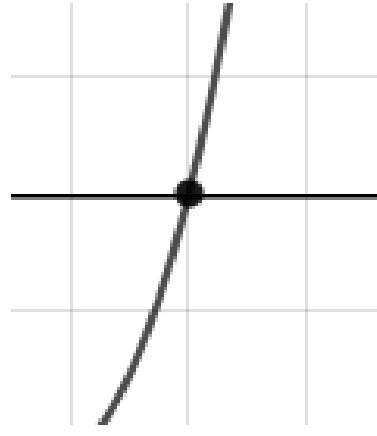
25. Describe the zero behavior of the zero $x = -8$ of the polynomial below.

$$f(x) = 4(x-7)^5(x+7)^3(x+8)^9(x-8)^8$$

A.

B.

C.   D.

E. None of the above.

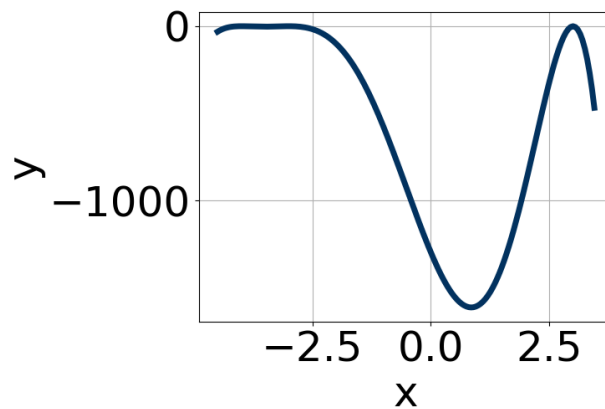26. Which of the following equations *could* be of the graph presented below?

A. $16(x+4)^{10}(x-3)^{10}(x+3)^6$

B. $-4(x+4)^4(x-3)^{10}(x+3)^4$

C. $14(x+4)^{10}(x-3)^4(x+3)^{11}$

D. $-7(x+4)^4(x-3)^{11}(x+3)^7$

E. $-10(x+4)^{10}(x-3)^6(x+3)^{11}$

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27. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in

the form $x^3 + bx^2 + cx + d$.

$$5 - 2i \text{ and } 4$$

A. $b \in [-17, -13], c \in [69, 79], \text{ and } d \in [-116, -115]$

B. $b \in [-7, 5], c \in [-5, 6], \text{ and } d \in [-9, -2]$

C. $b \in [-7, 5], c \in [-13, -6], \text{ and } d \in [10, 27]$

D. $b \in [14, 16], c \in [69, 79], \text{ and } d \in [114, 119]$

E. None of the above.

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28. Describe the end behavior of the polynomial below.
$$f(x) = -9(x + 2)^4(x - 2)^5(x - 6)^5(x + 6)^7$$

C.

A.

B. D.

E. None of the above.

---

29. Describe the end behavior of the polynomial below.
$$f(x) = 9(x + 3)^2(x - 3)^3(x - 4)^4(x + 4)^5$$

A.

B.

C.

D.

E. None of the above.

30. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.
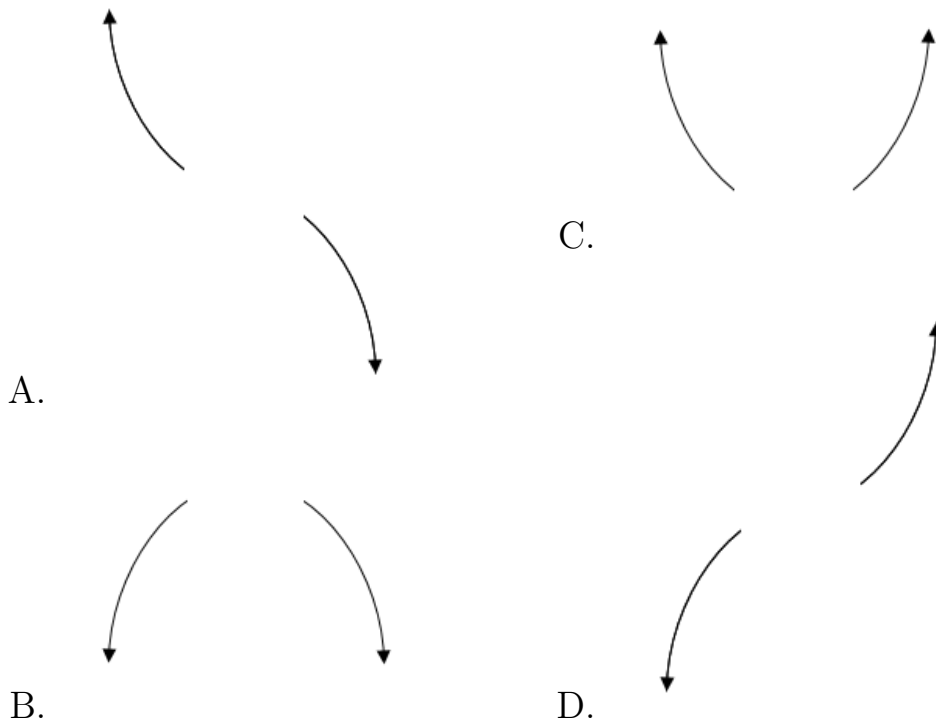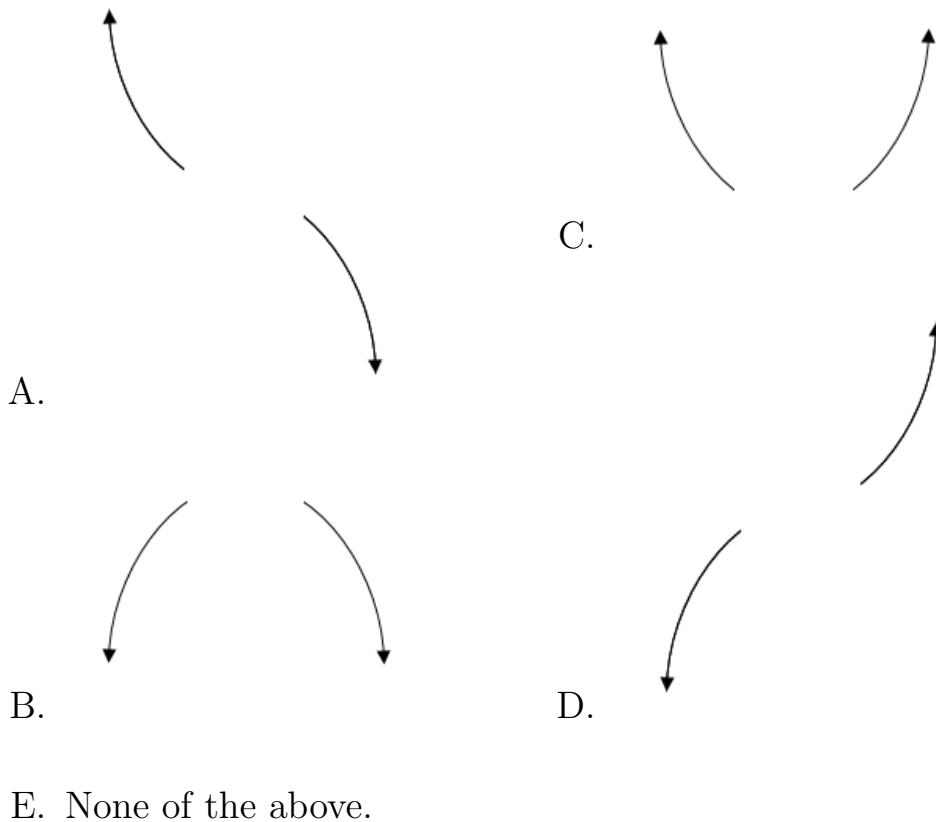
$$\frac{-7}{4}, \frac{-7}{5}, \text{ and } 4$$

A. $a \in [20, 23], b \in [-144, -139], c \in [301, 307], \text{ and } d \in [-196, -195]$

B. $a \in [20, 23], b \in [9, 18], c \in [-207, -199], \text{ and } d \in [189, 200]$

C. $a \in [20, 23], b \in [-19, -15], c \in [-207, -199], \text{ and } d \in [-196, -195]$

D. $a \in [20, 23], b \in [-92, -78], c \in [-26, -20], \text{ and } d \in [189, 200]$

E. $a \in [20, 23], b \in [-19, -15], c \in [-207, -199], \text{ and } d \in [189, 200]$